

10006736-1

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Apostolopoulos, et al.

Serial No.: 09/784,226

Filed: February 16, 2001

For: METHOD AND SYSTEM FOR
PACKET COMMUNICATION
EMPLOYING PATH DIVERSITY

Examiner: QURESHI, AFSAR M.

Art Unit: 2667

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REQUEST FOR CONTINUED EXAMINATION
IN RESPONSE TO OFFICE ACTIONHon. Commissioner of
Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22315-1450

Dear Sir:

In response to the outstanding Office Action mailed March 11, 2004,
Applicants respectfully request the Examiner to reconsider the Claims in light of the
following remarks and respectfully request allowance of the remaining Claims.

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IN THE CLAIMS

1. (Currently Amended) A method for communicating information from a sender to a receiver through a network having a first path and a second path comprising:
 - receiving an information stream;
 - generating at least a first subset of packets and a second subset of packets in response to the information stream;
 - establishing path diversity by sending the first subset of packets along the first path and sending the second subset of packets along the second path; and
 - dynamically changing the path diversity during transmission based on the communication conditions during a connection between a sender and a receiver.
2. (Previously Presented) The method of claim 1 further comprising the steps of:
 - receiving the first subset of packets;
 - receiving the second subset of packets;
 - recovering the information stream based on the first subset of packets, and second subset of packets, or both the first subset of packets and the second subset of packets.
3. (Previously Presented) The method of claim 1 wherein the step of sending the first subset of packets along the first path includes
 - identifying the first path by employing a path diversity service; andwherein the step of sending the second subset of packets along the second path includes
 - identifying the second path by employing a path diversity service.

4. (Previously Presented) The method of claim 1 wherein the step of sending the first subset of packets along the first path and the step of sending the second subset of packets along the second path includes

providing a source address, a destination address, a number of paths, the first stream and the second stream to a path diversity aware node;

the path diversity aware node identifying a first path and a second path, and

the path diversity aware node sending the first subset of packets along the first path and

sending the second subset of packets along the second path.

5. (Previously Presented) The method of Claim 1 further comprising:

dynamically changing the number of paths based on the communication conditions between the sender and receiver.

6. (Original) The method of Claim 1 further comprising:

dynamically changing at least one node of the first path or the second path based on the communication conditions between the sender and receiver.

7. (Currently Amended) The method of claim 1 wherein the network includes

a first relay having a first address and a second relay having a second address;

wherein the step of sending the first subset of packets along the first path includes sending at the first subset of packets along the first relay by addressing the first subset of packets with the first address; and

wherein the step of sending the second subset of packets along the second path includes sending at the second subset of packets along the second relay by addressing the second subset of packets with the second address.

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8. (Previously Presented) The method of claim 1 wherein the step of sending the first subset of packets along the first path includes

- specifying a first source route for the first subset of packets; and
- sending the first subset of packets along the first source route; and wherein the step of sending the second subset of packets along the second path includes
- specifying a second source route for the second subset of packets; and
- sending the second subset of packets along the second source route.

9. (Canceled).

10. (Currently Amended) The method of claim 1 wherein the network is a cellular telephone network, a packet network, an Internet, an Intranet, a local area network, a wireless local area network, a wireless local area conforming to IEEE 802.11 specifications, and/or a local area network conforming to Bluetooth specifications.

11. (Original) The method of claim 1 wherein the information is one of text information, file information, video information, audio information, voice information, multimedia information, control information, time sensitive information, time-sensitive video information, time-sensitive video information, and time-sensitive voice information, time-sensitive multi-media information, and time-sensitive control information.

12. (Currently Amended) A system for communicating information through a network comprising:

- a sender for receiving an information stream to be communicated;

a multiple stream generator for generating multiple streams that include at least a first stream and a second stream in response to the information stream; and

a path diversity unit coupled to the multiple stream generator for receiving the first stream and the second stream and for establishing path diversity by sending the first stream through a first path in the network and sending the second stream through a second path in the network;

wherein the path diversity unit dynamically changes the path diversity during transmission based on the communication conditions during a connection between the sender and a receiver.

13. (Original) The system of claim 12 further comprising:

a receiver for receiving the first stream and receiving the second stream; and
a recovery unit for recovering the information stream based on the first stream, the second stream, or both the first stream and the second stream.

14. (Original) The system of claim 12 wherein the network includes a first relay having a first address and a second relay having a second address; and

wherein the path diversity unit sends the first stream through the first relay by addressing the first stream with the first address; and sends the second stream through the second relay by addressing the second stream with the second address.

15. (Original) The system of claim 12 wherein the sender includes

an IP source router for specifying a first source route for the first stream, sending the first stream along the first source route, specifying a second source route for the second stream, and sending the second stream along the second source route.

16. (Previously Presented) The system of claim 15 wherein the first source route is

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one of a loose source route that specifies a subset of nodes of the route and a strict source route that specifies all the nodes of the route; and wherein the second source route is one of a loose source route that specifies a subset of nodes of the route and a strict source route that specifies all the nodes of the route.

17. (Currently Amended) The system of claim 12 wherein the network is a cellular telephone network, a packet network, the Internet, an Intranet, a local area network, a wireless local area network, a wireless local area conforming to IEEE 802.11 specifications, and/or a local area network conforming to the Bluetooth specifications.

18. (Original) The system of claim 12 wherein the information is one of text information, file information, video information, audio information, voice information, multimedia information, control information, time-sensitive information, time-sensitive video information, time-sensitive video information, time-sensitive voice information, time-sensitive multi-media information, and time-sensitive control information.

19. (Original) The system of claim 12 wherein the path diversity unit performs sending the first stream and the second stream through a first path and second path, respectively, by employing a path diversity aware node.

20. (Canceled).

21. (Canceled).

22. (Previously Presented) The system of claim 12 wherein the path diversity unit specifies one of all nodes to be traversed and a subset of nodes to be traversed; and

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wherein the subset of nodes can include one of at least one node in the beginning portion of the path, at least one node in the middle portion of the path, and at least one node in the end portion of the path.

23. (Original) The system of claim 12 wherein the path diversity unit dynamically changes at least one node of the first path or second path during transmission in response to communication conditions between the sender and receiver.

24. (Original) The system of claim 12 wherein the path diversity unit dynamically changes the number of paths employed during transmission in response to communication conditions between the sender and receiver.

25 (Original) The system of claim 12 having multiple paths and multiple streams; wherein the path diversity unit assigns streams to paths in one of a deterministic fashion, random fashion, and pseudo-random fashion.

26. (Original) The system of claim 12 further comprising:

at least two different Internet Service Providers for connecting the sender to the network;

wherein the path diversity unit achieves path diversity by sending different streams to each of the different Internet Service Providers.

27. (Original) The system of claim 12 further comprising:

at least two different connection technologies for connecting the sender to the network;

wherein the path diversity unit achieves path diversity by sending a first stream through a first connection technology and sending a second stream through a

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different connection technology.

28. (Currently Amended) The system of claim 12 wherein the different connection technologies include a satellite link, a wired link, a wireless link, and a cellular link.

29. (Currently Amended) The method of claim 12 allowing an application to specify to one of a sender and a path diversity service at least one QoS parameter for each substream of packets.

30. (Currently Amended) The system of claim 12 wherein the sender applies one of Forward Error Correction Coding to a packet ~~one of packets~~ sent along one of the paths and across packets sent along multiple paths and interleaving to a packet ~~one of packets~~ sent along one of the paths and across packets sent along multiple paths.

31. (Currently Amended) The system of claim 12 wherein the first stream and the second stream are dependent on each other; and wherein the sender applies interleaving and Forward Error Correction Coding to a packet ~~one of packets~~ sent along one of the paths and across packets sent along multiple paths.

32. (Previously Presented) The system of claim 12 wherein the sender employs path-hopping path diversity.

33. (Previously Presented) The system of claim 32 wherein the path diversity unit assigns streams to paths in one of a deterministic fashion, random fashion, and pseudo-random fashion.

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34. (Previously Presented) The system of claim 13 wherein the receiver can be one of a receiver that has no knowledge about path diversity transmission and a receiver that includes a mechanism for tracking the communication quality of each path and communicating the communication quality of each path to the sender for use in optimizing the transmission.

35. (New) A system for communicating information through a network comprising:
a sender for receiving an information stream to be communicated;
a multiple stream generator for generating multiple streams that include at least a first stream and a second stream in response to the information stream; and
a path diversity unit coupled to the multiple stream generator for receiving the first stream and the second stream and for establishing path diversity by sending the first stream through a first path in the network and sending the second stream through a second path in the network, wherein the path diversity unit performs path selection by employing a path diversity service that selects a path in response to path parameters; and
wherein the path diversity unit dynamically changes the path diversity during transmission based on the communication conditions during a connection between the sender and a receiver.

36. (New) The system of claim 35 wherein the path parameters can include a source address, destination address, number of paths, and quality of service requirements for each path; and wherein the quality of service requirements for each path can include bandwidth, delay and packet loss.

37. (New) A method for communicating information from a sender to a receiver through a network having a first path and a second path comprising:

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receiving an information stream;
generating at least a first subset of packets and a second subset of packets in response to the information stream;
establishing path diversity by
 sending the first subset of packets along the first path by
 specifying a first source route for the first subset of packets and
 sending the first subset of packets along the first source route, and
 sending the second subset of packets along the second path by
 specifying a second source route for the second subset of packets and
 sending the second subset of packets along the second source route,
 wherein the first source route is one of a loose source route that
 specifies a subset of nodes of the route and a strict source route that
 specifies all the nodes of the route; and wherein the second source route
 is one of a loose source route that specifies a subset of nodes of the route
 and a strict source route that specifies all the nodes of the route.
and
dynamically changing the path diversity during transmission based on the
communication conditions during a connection between a sender and a receiver.

REMARKS

Claims 1 - 34 remain in the present application. Applicants respectfully request examination and reconsideration of Claims 1 - 34 in light of the remarks set forth below.

35 USC 112 Rejections

The present Office Action indicates that Claims 10 and 17 are rejected under 35 U.S.C. 112 first paragraph, as failing to comply with the enablement requirement. The Office Action indicates the Examiner believes that Claims 10 and 17 are Markush-type claims drawn to a group consisting of a plurality of alternative elements and a provisional election is required. Without conceding that Claims 10 and 17 are Markush-type claims drawn to a group consisting of a plurality of alternative elements, Applicants have amended Claims 10 and 17 to read in the alternative "or".

35 USC 102(e) Rejections

Claims 1 - 8, 11 - 15, 18, 19 and 23 - 34 are rejected under 35 U.S.C. 102(e) for the reasons set forth on pages 3 and 4 of the present Office Action. Specifically, claims 1 - 8, 11 - 15, 18, 19 and 23 - 34 are rejected under 35 USC 102(e) as being anticipated by the Perkins (6,496,477) reference, which is hereinafter referred to as "Perkins" or the "Perkins reference".

Applicants respectfully submit that the present invention as claimed in Claims 1 - 34 is neither shown nor suggested by the Perkins reference. The present

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invention as set forth in the amended independent claims indicate path diversity is dynamically changed during transmission based on the communication conditions during a connection between the sender and a receiver. More specifically, Applicants respectfully assert the Perkins reference fails to teach or suggest dynamically changing the path diversity during transmission based on the communication conditions during a connection between a sender and a receiver, as recited in independent Claim 1.

Applicants also respectfully assert the Perkins reference fails to teach or suggest a path diversity unit dynamically changes the path diversity during transmission based on the communication conditions during a connection between the sender and a receiver, as recited in independent Claim 12.

The present Office Action indicates the Perkins discloses an adaptive software module that dynamically picks paths based on QoS (Col. 8 lines 45-49 and Col. 19, lines 4-12). Applicants respectfully assert that to the extent the Perkins invention may mention an adaptive software module to pick paths, it is directed towards run time of the software program rather than during transmission. Applicants also respectfully assert that basing the dynamic changes on communication conditions between the sender and a receiver during transmission is not the same as a predetermined QoS parameter. Applicants respectfully assert that changing the path diversity based upon actual communication conditions during transmission is not taught by a predetermined QoS parameter or requirement.

Applicants respectfully assert that dependent Claims 2 through 11 are allowable as depending from allowable independent Claim 1. Applicants also

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respectfully assert that dependent Claims 13 through 34 are allowable as depending from allowable independent Claim 12.

35 USC 103(a) Rejections

Claims 10 and 17 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Perkins et al. (US Patent No. 6, 496,770) in view of Narayanaswami et al. (US Patent No. 6,477,117). Applicants have reviewed the Akashi reference and, for the following rationale, Applicants respectfully assert that the present invention is neither anticipated nor rendered obvious by the Perkins et al. reference and/or the Narayanaswami et al. reference, alone or together in combination.

The present Office Action acknowledges the Perkins et al. reference fails to teach compatibility for wireless LAN, and more specifically the wireless protocols to include Bluetooth and 802.11. To the extent the Narayanaswami et al. reference may mention Blue Tooth and IEEE 802.11 protocols [Col. 4 line 65 to Col. 5 line 1], Applicants respectfully assert the Narayanaswami et al. reference does not teach a wireless local area conforming to IEEE 802.11 specifications as claimed in Claims 10 and 17. Applicants respectfully assert that the wearable mobile wrist watch capable of wirelessly accessing information mentioned in the Narayanaswami et al. reference [Col. 2 lines 10-- 15] does not teach dynamically changing the path diversity during transmission based on the communication conditions during a connection between a sender and a receiver.

Claim 34 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Perkins et al. (US Patent No. 6,496,770) in view of Cilhousen et al. (US Patent No. 5,109,390). Applicants have reviewed the Akashi reference and, for the following

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rationale, Applicants respectfully assert that the present invention is neither anticipated nor rendered obvious by the Perkins et al. reference and/or the Gilhousen et al. reference, alone or together in combination.

The present Office Action acknowledges the Perkins reference does not disclose a receiver tracking the communication quality of each path and communicates it to the sender for use in optimizing the transmission. The present Office Action alleges the Gilhousen et al. reference discloses a diversity receiver that tracks the above information and provides it to a diversity combiner. To the extent the Gilhousen reference may mention a diversity combiner, Applicants respectfully assert the Gilhousen et al. reference does not teach a receiver that includes a mechanism for tracking the communication quality of each path and communicating the communication quality of each path to the sender for use in optimizing the transmission. Applicants respectfully assert that to the extent the Gilhousen reference teaches of combining ratios of two signals [Col. 8 lines 21 - 30], the Gilhousen reference does not teach tracking the communicating the communication quality of each path to the sender for use in optimizing the transmission.

Allowable Subject Matter

The present Office Action indicates Claims 9, 16, and 20 - 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicants thank the examiner for indicating allowable subject matter.

Applicants have added new independent Claim 35 which includes the limitations of Claim 20 in independent form.

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Applicants have added new independent Claim 37 which includes the limitations of Claim 9 in independent form.


Conclusion

In light of the above listed amendments and remarks, Applicants respectfully request allowance of the remaining Claims. The examiner is urged to contact Applicants' undersigned representative if the Examiner believes such action would expedite resolution of the present Application.

Respectfully submitted,

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Date: 6/4/04, 2004



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